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JULY 23, 1949

SCIENCE NEWS LETTER

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THE WEEKLY SUMMARY OF CURRENT SCIENCE

Wing-Suspended Jets

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ENGINEERING

Gasifier Converts Coal

This may prove a cheaper way of deriving gases to be used for making synthetic liquid fuels. The method does not require the use of coking coals.

➤ A NEW TYPE continuous gasifier for use in the process of making synthetic liquid fuels from coal has successfully passed a full-scale test run, it was revealed by officials of the U. S. Bureau of Mines. The installation is in the Bureau's demonstration plant located in Louisiana, Mo.

This new type gasifier does not require the use of coking coals. Briefly, its cycle involves first crushing, pulverizing and drying the coal. Then, suspended in oxygen and accompanied by superheated steam, the coal is fed into both ends of the gasifier. There the conversion to synthesis gas takes place at temperatures up to 2,500 degrees Fahrenheit. The unit is designed to use about 28 tons of coal, 24 tons of oxygen and 35 tons of superheated steam to produce some 2,000,000 cubic feet of the raw gas daily.

Steam required for gasifying the coal is superheated in a pebble heater fired by gas. The oxygen is extracted from the air at temperatures more than 300 degrees below zero Fahrenheit in a Linde-Frankl unit originally used in making chemicals in Germany.

In a four-hour test, approximately 70,000 standard cubic feet per hour of gas was made. The product contained 37% carbon monoxide, 42% hydrogen, 16% carbon dioxide, 4% nitrogen and the rest miscellaneous. Bureau officials are hopeful that they can reduce the carbon dioxide content and obtain a higher yield of still better synthesis gas in later runs after they become more familiar with the operating characteristics of the new gasifier.

The Bureau's efforts are directed toward a cheaper method of converting coal to the gases from which the synthetic liquid fuels, including diesel oil, heating oil and gasoline, are made. Gasification, it states, is the number one cost and process problem requiring solution before competitive gasoline and oil can be made from coal by either of the two basic processes employed in the recently-dedicated plants there.

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MINERALOGY

Search for Hidden Ores

➤ IT IS going to take a lot of money to discover new deposits of mineral ores to replace present deposits facing depletion, the United Nations Scientific Conference on the Conservation and Utilization of Resources (UNSCCUR) will be told at its meeting at Lake Success next August, it was revealed by Dr. Anton Gray of the Kennecott Copper Corporation, New York.

The day of the oldtime prospector, with pick and shovel and grubstake, is largely over. Only a financially strong company can carry out efficiently the search for hidden deposits, the international group will be told by Dr. Gray. Only a government can afford, under present conditions, to carry out adequately exploration for unknown mineral districts.

Mineral deposits for the most part have been found in groups, or districts, in which the individual deposits occur under the same geological conditions and usually contain more or less the same metals. There are, also, what are apparently isolated deposits, although if the truth were fully known many of these probably would not be isolated.

The possibilities of discovery, the costs and the methods that would apply to explorations for new districts differ greatly from those that apply to explorations within a known district. Searching for an extension to a known deposit, a new ore body, is an easier problem and one being solved continuously by every mining company in the normal course of its development. Dr. Gray expressed the opinion that in the near future most new mineral sources will result from the discovery of extensions to known deposits.

New mineral districts, he indicated, will most likely be discovered only as present inaccessible parts of the earth are made accessible and under the incentive of greater need than we now have for the metals and higher prices for them. There may be mineral districts in the old rocks that are hidden under the sediments of the Mississippi Valley. There may be great mineral deposits under the swamps of the Amazon or beyond the shorelines on the continental shelves.

No prospector could ever find these, no private company could afford to search for them with the methods and tools available today; and yet with increasing geological knowledge and better tools they might be found, he said. Such explorations will be taken only by, or with the cooperation of, governments, and only as metals become very scarce and dear.

Science News Letter, July 23, 1949

ASTRONOMY

Plan Study of Sun with Balloons over Hudson Bay

➤ COSMIC RAY equipment carried aloft over Canada's Hudson Bay by balloons next month may help tell scientists about the sun's surroundings.

Intensity of cosmic radiation at northern altitudes will be measured by Geiger counters carried up to heights of 20 miles from Churchill, Manitoba. And these measurements may hold important clues to the suspected existence of a constant magnetic field around the sun.

Dr. Martin A. Pomerantz of the Bartol Research Foundation of the Franklin Institute, Swarthmore, Pa., will head the expedition. He will be assisted by Robert J. Kerr and Robert C. Pfeiffer, both of the Foundation.

If the sun has a constant magnetic field like the earth's, then cosmic radiation should remain constant north of a certain latitude. Otherwise, if there is no such field around the sun, the intensity of cosmic radiation will increase as the north pole is approached.

Free-balloon flights, each carrying a fourfold coincidence arrangement of counters, will be launched to make the ray measurements in the North. Data will be transmitted automatically to a receiving station on the ground.

The project is being sponsored by the National Geographic Society and the Bartol Foundation. Cooperating in the study will be the National Defense Board of Canada. This new cosmic ray venture is a part of a continuing program supported by the Air Force and the Office of Naval Research.

Science News Letter, July 23, 1949

GEOLOGY

Canada's Gold Mined in World's Oldest Rocks

➤ GOLD-BEARING rock formations in Canada, in the provinces of Ontario and southeastern Manitoba, constitute the world's "oldest known orogenic belt", states Dr. Patrick M. Hurley of the Massachusetts Institute of Technology in the journal, SCIENCE (July 8).

Age measurements based on radioactivity of rock samples and on helium trapped in the material range from 2,000,000,000 to 2,400,000,000 years. The formation which runs in a fairly continuous belt of volcanic and sedimentary rocks, appears to consist of the roots of an exceedingly ancient mountain range, eroded away no one knows how long ago.

Science News Letter, July 23, 1949

BIOCHEMISTRY

Body Builds Fat in Aging

A theory that a switch in body chemistry takes place in the aging process which changes food utilization places emphasis on a diet in maturity to avoid diseases.

➤ AGING is characterized by a shift in body chemistry toward building up of fat, rather than protein, from food.

This new theory, with implications for the problems of cancer, degenerative diseases and diet in maturity, is proposed by Dr. Jean Mayer, research fellow at George Washington University School of Medicine in Washington and Nutrition Officer of the United Nations Food and Agriculture Organization.

In a very young animal, he found, an increase by five grams (approximately one-fifth of an ounce) represents about one part by weight of protein and four parts of water and minerals, or an energy content of roughly five calories. But an increase of five grams in an older animal may represent all fat (five grams), or 45 to 50 calories.

Growth and weight increase, therefore, are not exactly equivalent. A given weight increase may mean something quite different in a child and in a grown-up. In the progressive slowing and stopping of growth and beginning of the aging process, there is a change from one type of food utilization to another, but not a sudden decrease in the efficiency of food utilization.

Dr. Mayer sees in his theory a warning on diet for grown persons. In a report to the journal, GROWTH (June), he states:

"A diet promoting good, economical growth in youth tends to promote fat deposition in adulthood, and possibly the development of degenerative diseases and malignancies (cancer).

"The assumption that diets judged adequate in growth studies (that is, for growing children or animals) are good maintenance diets (for grown-ups) appears particularly dangerous in this light."

In cancer cells he thinks there may be a sudden or a progressive reversal from the adult characteristic of fat synthesis to the youthful characteristic of protein building. In this the cancer cells are like the "potentially immortal" cells or tissues that are kept growing for years in artificial cultures outside the body. The "potentially immortal" tissues show that if certain glandular influences are withheld, the cells or groups of cells continue in the pattern of protein building and are not submitted to the process of aging.

The glandular influence fits into Dr. Mayer's theory because the change in the pattern of food utilization corresponds to the glandular shifts that come at the beginning of the teen age. On the glandular side there is at this age a shift from a preponderance of growth hormone to a preponderance of the fatlike steroid hormones, such as the sex hormones.

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PSYCHOLOGY

Racial, Religious Hatreds May Stem from Self Hate

➤ IF A man hates or despises Negroes, Jews, foreigners, and so on, it may be because he hates and despises himself.

This is the implication of a study made at the University of Chicago by Dr. Elizabeth T. Sheerer, now of Iowa State College. Intensive study of therapeutic interviews with 10 persons revealed a "definite and substantial" relation between the individual's regard for himself and that of his feeling toward others.

It was also found to be possible to improve acceptance of and respect for the self by the psychological treatment. There was also found to be an even closer relation between regard for self and regard for others after the finish of the treatment period.

When the individual's statements about himself were rated on a five-point scale, the average for the first interview was 2.2. The statements about other people rated 2.6. In the last interview the statement on self rated 3.9 while those reflecting on others had gone up to 3.8.

Dr. Sheerer foresees applications of her findings toward the solution of social problems.

"It might mean," she says, "that increased acceptance of minority groups, foreigners, and the like, could best be achieved by some type of group therapy which would tend to alter the individual's acceptance of and respect for himself.

"It might mean that in situations of industrial tension, or professional friction, the most effective means of approach would be through dealing with the attitudes of the person toward himself, rather than devoting our energies to the expressions of, and descriptions of, the external 'causes' of the tension."

Details of Dr. Sheerer's study are reported in the JOURNAL OF CONSULTING PSYCHOLOGY (June).

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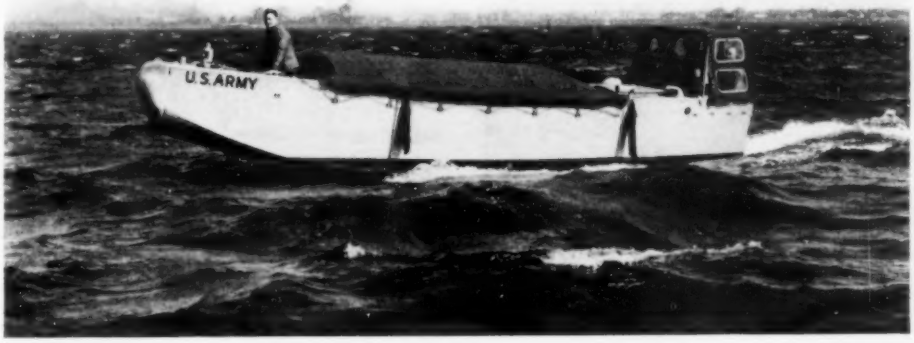
PSYCHOLOGY

Officers Learn To Read At 488 Words Per Minute

➤ AIR FORCE officers who have completed training in the Pentagon's new Reading Improvement Laboratory are now reading 66% faster than they were six weeks ago.



SECTIONAL CARGO BOAT—Built in three parts, and easily disassembled, this 32-foot, all-aluminum, Army cargo boat was designed so that it can be transported in a cargo plane, and is intended especially for Arctic operations. The rear section, with its 60-horsepower engine, can be used as a separate power unit to propel rafts and barges.

The average reading rate for the 120 officers when they entered the class was 292 words per minute with 83.2% comprehension of what they read. On completion of the course, their reading rate had gone up to 488 words per minute in spite of the fact that the test used was more difficult. But their comprehension had dropped slightly to 79.3%. The next class will be cautioned to take it a little easier so as not to sacrifice any of their comprehension.

The slowest reader on entering was an officer who painstakingly read every word and back-tracked frequently to make sure of getting everything. His speed was only 106 words per minute but his comprehension was perfect—100%. On "graduating", this officer read at the rate of 226 words per minute, more than a 100% improvement in speed, and he did not lose anything in understanding. His comprehension score was still 100%.

Fastest reader in the group on entering was a Colonel who read 456 words per minute with 80% comprehension. On completion of the course, the Colonel scored 810 words per minute with 70% comprehension.

Training in the Reading Improvement Laboratory is under the direction of Maj. B. E. Prater. (*See SNL*, July 16 p. 39).

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MEDICINE

Infant Diarrhea Relieved

➤ COMBINING an anti-allergy drug, benadryl, with a sulfa drug brought rapid improvement in 40 babies suffering from infant diarrhea, Dr. C. Zahra Neumann of the Royal Malta University reports in the BRITISH MEDICAL JOURNAL (July 16).

Infant diarrhea, known medically also as infantile gastroenteritis, is the serious disease which has many times swept through hospital nurseries, often killing large numbers of babies. It is believed to be an infection but scientists in years of search have been unable to pin the cause to a single germ. Many different remedies have been tried, but no one has been universally successful.

Dr. Neumann believes that the symptoms of the disease can be explained, at least in part, as a sign of histamine poisoning. Histamine is a chemical normally formed in the body. Among other actions, it stimulates stomach secretion. Given experimentally in large enough doses it can bring on vomiting and diarrhea, often with strong colicky pains.

Release of too much histamine in the body is believed to play a part in allergies such as hayfever, hives, and asthma. Many modern anti-allergy drugs, such as benadryl, are really anti-histamine chemicals.

When benadryl and a sulfa drug, sulfamezathine, were given in combination to 40 babies, the diarrhea stopped in five days, Dr. Neumann reports. There was only one death, compared to three in 42 babies treated with the sulfa drug alone, and four out of 24 babies treated by a short period of starvation except for salt and sugar solutions given by mouth or vein.

Other favorable effects from the combination of drugs were, Dr. Neumann reports, "the very quick disappearance of toxemic (poisoning) symptoms."

Vomiting stopped in a very short time. Prostration, difficult or labored breathing and rapid pulse subsided in most cases in a few hours.

"The continuous and irritating whine," Dr. Neumann states, "is replaced by a more peaceful cry. This is not surprising, as benadryl seems to have a sedative effect on the central nervous system, and in certain cases infants who have been unable to sleep owing to restlessness or colic repose quietly after a few doses."

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Question Box

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Photographs: Cover, Northrop Aircraft, Inc.; p. 51, Edo Corporation; p. 53, American Veterinary Medical Association; p. 55, General Electric Co.

● RADIO

Saturday, July 30, 3:15 p. m., EDST
"Adventures in Science" with Watson Davis, director of Science Service, over Columbia Broadcasting System.

Dr. Kenneth E. Appel, professor of psychiatry, Medical School of the University of Pennsylvania, in Philadelphia, will talk about "Rules for Successful Living."

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MEDICINE

Plastic False Lung Made

It is shaped to fill a lung cavity in patients who have had a lung removed due to TB or cancer. Purpose is to keep neighboring body parts in place.

➤ A FALSE lung, made of a plastic material shaped into a bag and filled with fiberglass, may become the newest thing in human spare parts to replace those lost because of injury or disease.

The false lung, under experimentation now at the Mayo Clinic in Rochester, Minn., would be used to fill the hollow space left when a lobe or an entire lung is removed surgically in cases of tuberculosis or cancer. It would not, of course, do any breathing.

The need for such a lung and results of experiments to date were reported at a staff meeting of the clinic by Drs. John H. Grindlay, O. Theron Clagett and Arthur H. Bulbulian.

When a lung or a lobe of a lung is removed, the body tries to obliterate the space, Dr. Clagett pointed out. This is done by a raising of the diaphragm, a shift of the partition between the lung sacs, narrowing of the spaces between the ribs and overexpansion of the remaining lung tissue.

Usually this is accomplished without any serious disturbance or disability, particularly in young people. But in cases where the operation has been performed for tuberculosis, overexpansion of the remaining lung tissue is "highly undesirable" because it may light up tuberculous infection in the remaining lung. And cancer of the lung, chief condition for which an entire lung is removed, occurs most often in older patients who do not have very elastic tissues and consequently can stand least well the overexpansion of the remaining lung.

The first false lung tried by the group was a sheet of polythene made into a lung-shaped bag by fusing the edges together with heat and pressure. This bag, however, had some mechanical defects. In eight dogs on whom it was used, it burst and the non-sterile interior of it caused infection which killed the dogs. Two more out of a series of 21 died because of injury produced by the sharp seam of the bag on neighboring blood vessels. But nine dogs are still alive, eight to 12 months after the operation.

An improved false lung has since been made of another plastic, methyl methacrylate. This is lucite or plexiglass. It is thin-walled, lightweight, has a perfectly smooth surface and has been shaped to fit the lung cavity. It was first tried on another series of dogs four to five months ago. So far, the dogs are all well and X-ray pictures have shown no signs of leaks of their false lungs.

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ENGINEERING

New Mechanical Spring

➤ A UNIQUE mechanical spring that becomes easier to deform as a load is continued to be applied has been developed by W. J. Cook, of the Hunter Spring Company, Lansdale, Pa., and many applications for its use in the mechanical world are promised. It is reported to be unlike all other springs.

Everybody knows that in winding a clock, it becomes harder to wind as the spring is tightened. Mechanics know that with the familiar coil spring, a little pull will start the lengthening of the coil but as it grows in length a stronger pull is required to continue the action at the same rate. The new spring, called the neg'ator, acts contrary to accepted engineering principles, and resists less the more it is deformed from its normal condition.

The secret of the new spring, Mr. Cook states, lies in prestressing each successive increment of length of a flat strip by a predetermined, but not necessarily constant, amount. In its relaxed position the device forms into a tight coil, each turn pressing on the others. In use, this new type of spring is progressively unwound, or drawn out like a tape rule, over its range of action. Its resisting force is developed as each successive length of the metal strip is drawn off the coil, and is straightened thereby. The force required to do this varies inversely as the radius to which the metal strip has been prestressed at that point.

Obviously, he continued, if the neg'ator is heavily prestressed near the free end and only lightly prestressed farther along the coiled length, the device will pull back more at the beginning of its range of action than at the end of the action.

Among applications in which the device may be found valuable, are in toasters, delicate instruments, hose wrapping, extension or compression spring, automatic coiling device, a friction band, a telescopic tube form, and many others. It has a wide range of action, up to 50 times any original dimension, and can act around corners and through small openings with the same freedom as non-elastic bands or cables. This new spring gives promise of greatly influencing the future of mechanical design.

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VETERINARY MEDICINE

'Teen-Age Boy Wins Prize For Devotion to His Dog

➤ A BOY'S devotion to his dog received recognition and reward when the 1949 National Humane Act Award of the American Veterinary Medical Association was presented at their meeting to Richard Rose, 17, of Detroit, together with a $100 U. S. savings bond.

When Richard was an 18-month-old baby he was given a bulldog puppy named Jiggs. Boy and dog grew up together, but the inevitable tragedy occurred, for while Richard was still young Jiggs became, for a dog, very old, and began to go blind.

An operation to save the dog's sight was attempted, but it was unsuccessful. Richard gave up most of the fun a 'teen-ager likes, to take care of his old companion. He built a headgear equipped with bumpers, to save Jiggs from running into things.

Veterinarians think this type of headgear will be useful in making life easier and less risky for other blind dogs.

The Humane Act Award of the AVMA is given each year after a consideration of cases of kindness to animals to which its attention has been called.

At the same meeting, the Association's

DEVOTION BRINGS AWARD—The 1949 National Humane Act Award of the American Veterinary Medical Association was granted Richard Rose for building a headgear equipped with bumpers, to save his dog from running into things.

highest honors to a member of the veterinary profession were conferred on Dr. Gerard Dikmans, who came to this country as a 19-year-old immigrant from the Netherlands in 1905. A graduate in veterinary medicine from Michigan State College, he has made a life-time study of animal parasites and the diseases they cause.

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ENGINEERING

Long-Lived Crystals

➤ QUARTZ crystals, essential in radio and television, will have practically unlimited frequency-control life without deteriorating as a result of a heat-treatment process revealed at the laboratories of the U. S. Army Signal Corps, Fort Monmouth, N. J., where it was discovered.

The process involves superheating the crystal to approximately 900 degrees Fahrenheit, followed by slow cooling. Finished blank crystals are placed on a conveyor belt and passed through an electrically heated oven for a period of from two to three hours, then subjected to cooling through a 24-hour period.

The job of the quartz crystal in all types of radio transmission, and in other electronics, is to keep the emitted signals on their assigned radio-wave frequency. But these crystals age in use, permitting the signal to slide or "drift" away from the desired frequency. They must then be replaced. A crystal which has been subjected to the new Signal Corps process, however, will hold to the desired channel indefinitely, and probably will never have to be replaced.

The discovery, made by Arthur C. Prichard, Maurice A. A. Druesne and Dr. David G. McCaa of the Signal Corps laboratories, is of vast importance not only to the armed forces but to civilian radio, television and communications, in all of which great quantities of quartz crystals are now used. They are imported products, because few satisfactory crystals have ever been found in United States. Had this new method been available during the recent war, many millions of dollars spent for replacements would have been saved.

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ENGINEERING

Steel-Making in Russia

➤ SOVIET RUSSIA is reported to be spending two billion dollars, the estimated cost of the American development work on the atomic bomb, on a new method of making steel. This huge expenditure is listed in the ANNALS OF THE AMERICAN ACADEMY OF POLITICAL SCIENCE (May).

Dr. Gerald Oster, physical chemist at the University of London, says that the huge sum is being spent by the Soviet government on steel plants in the Donbas and Soviet Asia. The process, which uses pure oxygen or oxygen-enriched air in the blast used to make steel, is being used more or less widely in this country.

U.S.S.R. development of the use of oxygen in steel making is based on the work of Russia's best known atomic scientist, the English-educated Dr. Peter Kapitza, the report explains. Dr. Kapitza has developed a turbine for producing large quantities of pure oxygen more quickly and cheaply than previous methods.

In the new oxygen process, cost of making steel is said to be reduced 25% to 30%.

Another important industrial use of oxygen in the Soviet, Dr. Oster states, is in work on burning coal underground to produce gas. Proposed by famed Russian chemist, Mendeleev, in 1888, underground gasification of coal was first experimented with by the Soviets in 1931, Dr. Oster says. American scientists also are working on this.

Dr. Oster, who was formerly a research associate at the Massachusetts Institute of Technology and Princeton University and was on the staff of the Rockefeller Institute for Medical Research, praises Soviet planning of scientific research. The way research is organized in the U.S.S.R., he terms "comparable" to the program of American and British work which produced the atomic bomb.

Soviet mathematics is lauded in the same publication by a Princeton University mathematician.

Mathematical developments in the U.S.S.R., comments Dr. Solomon Lefschetz, "parallel those in the United States with equal energy and vigor in research."

Importance of Soviet mathematical work is indicated by the fact that many young American mathematicians are learning scientific Russian just to read of work done by the Soviets. Dr. Lefschetz declares.

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NUCLEAR PHYSICS

Plastic Balloons To Carry Instruments Higher

➤ SUPERBALLOONS of thin, tough plastic will soon carry scientific apparatus weighing as much as two men to greater heights above the earth than now achieved, it was learned at the University of Denver International Cosmic Ray Symposium in Idaho Springs, Colo.

Much information about cosmic rays from outer space has been obtained from recorders and photographic plates hung from balloons that rise 18 to 20 miles upward in the Office of Naval Research "Operation Skyhook." At their highest altitude these bags filled with helium gas are about 75 feet in diameter and scores have been launched from Camp Ripley, north of Minneapolis.

Some of the flying saucers that have been reported were undoubtedly these high-flying balloons shimmering in the sky. The unaided human eye can see these balloons even 20 miles high.

The new balloons are made bigger and better by use of a process of welding the very thin film of polyethylene plastic of which they are composed. Ordinary Scotch tape was used in the beginning to put the balloons together, and while special adhesives are now available, the welded seams will make possible hundred-foot-diameter balloons. Several miles higher will be reached with these new balloons, and this is expected to capture incoming cosmic particles, less impeded because of the even rarer atmosphere at such great heights.

With a lift of about 300 pounds provided by three balloons, larger loads of cosmic ray counters and photographic plates will be sent upward to regions that man cannot visit. Usually only one balloon carrying less weight will be used.

This apparatus is parachuted back to earth when the balloons reach their greatest heights, and the messages they carry help explain the mysteries of how matter is put together.

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BIOLOGY

Chart on Mammals Lists Biologic Characteristics

➤ IF YOU know the weight of an elephant's brain, you can get at a glance such data as his water intake and body weight. Or you can spot the weight of a mouse's liver, if you know his heart beat.

These are some of the possibilities with a chart developed by Dr. E. F. Adolph of the University of Rochester. Dr. Adolph's chart, published in the journal, SCIENCE (June 10), listed 34 properties of mammals including man. The relationships between these 34 biological characteristics have been established so that with the chart, a ruler and any one of the measurements, you can immediately read off any of the other 33 for a particular mammal.

Relationships on which the chart is based apply to physiological processes, sizes of organs, numbers of reduplicated structures and biochemical compositions.

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RADIO

Long-Range Transmission

Discovery of like-ionospheric characteristics on opposite sides of the earth will aid in predicting conditions for long-range radio transmission.

➤ PREDICTING conditions for long-range radio transmission will be aided by recent findings at the National Bureau of Standards which makes possible a more complete picture of world-wide conditions of the ionosphere. This is the layer of electrically charged atmosphere high above the earth that reflects radio waves and makes long-distance radio transmission possible.

Important in the findings is that the ionospheric characteristics at any point on the earth are almost identical with those at a point on the other side of the earth directly opposite. Scientists call such positions antipodal points. Baton Rouge, La., and Watheroo, western Australia, are antipodal points at which testing stations are located. It has been found that Watheroo is as efficient for predicting Baton Rouge as it is for predicting Brisbane in eastern Australia.

For many years, much study has been given to the ionosphere, which scientists think is a series of ionized layers in the atmosphere some 50 to 250 miles above the earth. It is thought to be made electrically conducting through the action of ultraviolet light. Radio waves traveling in straight lines through the lower atmosphere are bent away from the vertical as they penetrate the ionosphere at an oblique angle. Certain frequencies are returned to the earth's surface, where they are reflected back toward the ionosphere. Were it not for these alternate reflections by the earth and ionosphere, it would be impossible to transmit any but purely local messages on high frequencies.

The ionosphere continually exhibits fluctuating characteristics because of changes in the amount of ultraviolet light it receives from the sun. The study of solar activity as evidenced by sunspots thus becomes a means of predicting ionospheric conditions. The earth's magnetic field also plays an important part in the distribution of ions. Other variations of the ionosphere with locality, season, and time of day or night constitute a complex geophysical phenomenon.

Daily "soundings" of the ionosphere are now being taken all over the world by an international network of 53 ionosphere stations, 14 of which are operated by the National Bureau of Standards. These stations collect data by emitting pulses of radio waves vertically upward and receiving their reflections with radar-like equipment.

In addition to other information, the daily soundings measure the heights of the various layers in the ionosphere and indicate the degree of absorption of radio energy. This is related to the power required to transmit a given frequency over a particular distance. All the information obtained by the soundings is correlated with sunspot predictions to provide the working data used by the Bureau in predicting radio propagation conditions.

One over-all result of the work at the Bureau, which establishes the possibility of utilizing antipodal stations, is effectively to double the number of ionospheric sounding stations now available for prediction purposes. Gladys White and R. F. Potter of the Bureau staff are given credit for the achievement.

Science News Letter, July 23, 1949

BOTANY

Electricity May Help Insect-Catching Plant

➤ MEASUREMENTS showing a tiny electrical voltage from Venus' flytrap, a famed insect-catching plant, may help explain the operation of this strange death trap for flies, spiders and other insects.

Otto Stuhlman, Jr., of the University of North Carolina, told the American Physical Society in Cambridge, Mass., how the electrical measurements were made on the plant. The small voltages ranged from five-hundredths of a volt for summer growth plants down to one-hundredth in winter growth plants. The voltage changes moved from trigger hairs on the leaf across the leaf to the closure mechanism at a speed of about an inch a second.

Venus' flytrap has hinged leaves which operate on luckless insects in the manner of a common steel trap. The spike-like trigger hairs on the leaf start it closing.

The plant, found in some parts of North Carolina, was once called by Darwin, "the most wonderful plant in the world." Its diet includes at least as many spiders as flies, plus even such items as small toads.

Science News Letter, July 23, 1949

ENGINEERING

Ultrasonic Generator Utilizes Quartz Crystals

➤ WAFER-SHAPED quartz crystals, similar to those used to control radio wave frequency in transmitting stations, are employed in a new ultrasonic generator, a research device which emits sound waves pitched above the range of human hearing.

Generators of ultrasonic waves have become more or less widely used in the past few years in laboratories, and practical applications are rapidly developing. These high frequency waves produce heat in objects in their path. They will kill insects, and also have killed white mice. Possible uses include the sterilization of foods, medical treatment, elimination of smoke, speeding up chemical reactions, homogenizing milk, and many other applications in biological, chemical and physical fields.

This new ultrasonic generator, which utilizes quartz crystals to produce the "silent" sound waves, is a product of General Electric. The crystals vibrate when electric voltages are applied across them. The wave frequency is dependent upon the size of the crystal, C. F. Falk, General Electric engineer, stated. They are roughly similar in size and shape to a hockey puck.

The new equipment is contained in a cabinet which resembles a small floor-model radio. Mounted on top is a transparent cylindrical case filled with oil within which the crystal is placed. The oil serves to insulate the high-frequency voltage across the crystal, and to transmit the sound waves to the test chamber directly above the crystal. Experiments with ultrasonics are conducted in the test chamber. A glass rod stuck into the chamber for a very short period becomes hot enough to burn holes in the paper.

Science News Letter, July 23, 1949

SILENT SOUND GENERATOR—Quartz crystal, contained in the translucent plastic case on top of the cabinet, generates high frequency sound waves pitched so high that the human ear cannot hear them. The new generator was developed by General Electric for research into the possibilities of putting the inaudible waves to work.

VETERINARY MEDICINE

Blood Disease Like RH Trouble Found in Dogs

➤ A BLOOD disease like the Rh trouble that affects human babies has been produced in puppies by the same process of antagonism between the blood of the parents that causes the trouble in human offspring.

The cases of the puppies, one of them with jaundice such as develops in human babies with Rh trouble, is reported by Drs. Lawrence E. Young, Donald M. Ervin, Richard M. Christian and R. Wendell Davis, of the University of Rochester School of Medicine, in the journal, SCIENCE (June 24).

The mother of the puppies had blood which was Do-negative, on the basis of the scientists' grouping of dogs' blood. She was given transfusions of dog blood cells that were Do-positive. Then she was mated to a Do-positive male. The mother was "mostly pointer" and the father "mostly German shepherd".

Four of the puppies were Do-positive and these were the ones with the blood disease. The other four puppies of the litter were Do-negative and showed no sign of the blood disease.

One case of the blood disease occurring naturally in dogs, newborn dachshunds, has previously been reported. The Rochester experience is believed the first in which the disease was produced by previous transfusion to the dog mother. Better knowledge of the disease as it occurs in human babies may result from further studies with the dogs.

Science News Letter, July 23, 1949

CHEMISTRY-BOTANY

Cheer Up, Bachelors! 2,4-D Poisons Mistletoe

➤ NOTE for determined bachelors: mistletoe, which will develop its dangerous properties six months hence, may be killed now with 2,4-D and its newer companion weedicide, 2,4,5-T.

Information on this newest use of weed-killing chemicals comes from two sources, the Forestry Commission of New South Wales, Australia, and the U. S. Department of Agriculture in Washington.

To be sure, the scientists of the two organizations are not especially interested in discouraging Yuletide romance—most of them are married already. What they are concerned about is saving trees from the sap-sucking activities of various species of mistletoe; for this popular Christmas "green" lives as a parasite on the branches of trees, often stunting their growth and in extreme cases even killing them.

An Australian scientist, D. Hartigan, reports that he has had some success with 2,4-D and related chemicals in attacks on species of mistletoe parasitizing valuable eucalyptus trees. The clumps of mistletoe were browned and withered within three weeks after spraying, while the trees showed no damage.

In this country, states L. W. Kephart of the Department of Agriculture, 2,4-D and 2,4,5-T are being used in efforts to clear Oklahoma rangelands of scrub oak that has taken possession. Field workers have reported that mistletoe clumps on the branches of these small oak trees succumb to the poison sprays more readily than do the oaks themselves. In this case, both the host-plant and its parasite are weeds, so that the differential effect does not mean much. However, if it proves possible to kill mistletoe without harming more valuable trees on which it grows, this discovery may eventually be significant in the care of street and park trees in mistletoe-infested regions of this country.

The fact that the chemical sprays can harm or kill mistletoe without apparent damage to its host-trees seems to be due to the one-way traffic that obtains in the parasitic life of the plant. Mistletoe sucks sap out of its host-tree but gives nothing in return. Hence it is unable to transmit into the tree any of the poison that is killing it.

Science News Letter, July 23, 1949

ORNITHOLOGY

Bird-Brained Birds Get Drunk or Save Rock "Nuts"

➤ TO ERR is more than just human. Birds, it seems, make mistakes, some of them remarkably like human failings.

Austin L. Rand, curator of birds at the Chicago Natural History Museum, calls the bird boners "maladaptations."

Here are some of them:

Drunken robins, which may become "utterly fearless and perhaps a bit belligerent," get that way from feeding on the berries of the Tartarian honeysuckle. A few dead robins have been found near the shrub, probably poisoned by their berry diet.

Birds which store supplies of food may get more credit from humans than they deserve, some observations have indicated. The California woodpecker saves acorns in holes which he drills in trees. But when the acorn crop fails, the bird still keeps up his storage activities, putting useless pebbles in the holes. Another conserving bird which might have delighted old Ben Franklin was a captive raven which attempted to store small fish by pushing them through a knothole in its cage. Only difficulty was that the fish fell out of the bird's reach when thus stored.

And a scientist in Africa once discovered that birds that lay their eggs in other birds' nests aren't always very careful. The egg of a honey-guide bird was found in the nesting hole of a little barbet. If and when the egg hatched, it would have been impossible for the nestling to get out of its much-too-small home.

Science News Letter, July 23, 1949

IN SCIEN

ZOOLOGY

Darwin's Theory About Giraffe's Neck Challenged

➤ DARWIN was wrong about the giraffe, declares a London newspaperman-naturalist, Chapman Pincher of the DAILY EXPRESS. It got its long neck, not through the necessity for reaching upward into treetops for food but through having to stretch downward to ponds and streams to get water, he holds.

Mr. Pincher believes that the giraffe started out by evolving extra-long legs as a response to constant danger from lions and other beasts of prey. The longer the legs the more easily it could escape; present-day giraffes can work up a speed in excess of 30 miles an hour without trying very hard. In its case, as in that of other hoofed animals, survival of the fit meant survival of the speedy.

As its forelegs grew longer and longer, it became necessary for its neck to grow longer, too, so that the animal might drink, argues Mr. Pincher. He points out, also, that giraffes often reach downward to feed on grass, as well as upward to feed on tree leaves.

The giraffe's nearest relative, the okapi, has rather long forelegs and a correspondingly long neck and feeds exclusively on leaves, Mr. Pincher admits. However, he counters, the okapi lives in dense forests, where there is nothing to eat but leaves. Therefore, he contends, his long-neck-because-long-legs argument still holds good.

Mr. Pincher's theory of giraffe evolution is proposed in the journal, NATURE (July 2).

Science News Letter, July 23, 1949

CHEMISTRY

Shipboard Factory Makes Weed-Killer for Sweden

➤ SWEDEN'S relatively modest needs for a chemical weed-killer are being satisfied by the product of a Bristish factory. But the factory is not in Great Britain; it is in Gothenberg, Sweden. After it has done its work it will go away again.

Answer to the riddle is that the factory is aboard a 600-ton ship that crossed the North Sea and anchored in Gothenberg harbor, prepared to do business. It brought British chemists along on board; additional Swedish workers were hired in Gothenberg.

The product, known to chemists and agriculturists as Phenoxylene, kills ordinary weeds but does not affect grains or most other grasses. Its action is similar to that of 2,4-D, much used in the United States.

Science News Letter, July 23, 1949

NE FIELDS

ELECTRONICS

Television Will Be Usable In Ultra-High Frequencies

➤ PRESENT day television receiving sets will be usable when ultra-high frequency broadcasting comes into use, a probability of the near future, by use of a new television converter designed by Stanford Research Institute, Stanford, Calif. It is an electronic "step-down" device.

This small device can be used with any standard television set to make it possible to receive signals from stations operating within the ultra-high frequency region, according to Dr. J. E. Hobson, director of the Institute. It is described as an electronic circuit which steps down the ultra-high frequencies to the frequency range for which the present standard models are intended. Present bands assigned to television extend from 54 to 216 megacycles; new bands for probable assignment will be much higher.

This converter has been designed in three types; one for fixed frequencies of 530 megacycles, another tuneable over the 475 to 675 megacycle range, and a third tuneable over the 475 to 890 range. The third is not yet ready for production, but is in experimental use.

The rapid growth of television makes the assignment of new transmission bands essential. The present radio frequency range available to television, from 54 to 216 megacycles, permits the use of only 12 channels. This limits to 12 the number of television transmitting stations operating in any given area.

At the present time, a great deal of experimentation is being carried on with ultra-high frequencies. It is expected that the United States controlling office, the Federal Communications Commission, will soon authorize new channels in the region of 475 to 890 megacycles, and a number of experimental stations are already in operation within this band.

Science News Letter, July 23, 1949

ENGINEERING

New U. S. Standards List Of 1,124 Now Available

➤ AMERICAN Standards, 1,124 in number and covering specifications for American products to protect consumers, are included in a new list issued this month by the American Standards Association. More than 140 have been added since the beginning of the year .

The list is available to those interested without charge. In it are standard specifications, methods of test, building requirements, safety codes, definitions and terminology in all fields of engineering as well as for materials and equipment used by the ultimate consumer. All of these have been given the status "American Standard" through the procedure of the association which assures all groups concerned an opportunity to have a voice in their development.

The American Standards Association, with headquarters at 70 East 45th Street, New York, is a federation of national groups dealing with the standardization of products. Through it, government, industry, labor and consumer work together to develop mutually satisfactory national standards. It acts also as the authoritative channel for international cooperation in standardization work.

Science News Letter, July 23, 1949

ARCHAEOLOGY

Archaeologists Find Ancient Gambling Joint

➤ A RAID on a popular gambling hell has been conducted by a group of very staid University of California archaeologists.

Not the moral dander of the scientists was aroused; their interest was purely academic.

The chance to find out how a bunch of slick prehistoric crap-shooters operated was too much of a temptation. There haven't been any boys in this back room for a considerable number of centuries. The proprietors folded, probably before the white man came to America.

Franklin Fenenga and Francis Riddell, archaeologists of the California Archaeological Survey, report that their gambling hell is Tommy Tucker Cave, 200 feet up the side of a slope in Lassen County, near the Nevada line.

Artifacts include more than 800 short wooden counting sticks and dice of the primitive Indian gamblers. The dice are of a kind which no modern crap-shooter would recognize. They were split sections of cane, with one side flat, one side round. They were tossed in a basket; betting was on how many would come up round, how many flat.

A knotted, curved sagebrush stick heavily wrapped with bark at one end—an instrument remarkably suited for breaking heads—gave rise to speculation by the archaeologists that a bouncer may have been needed. A "mural" on the wall, containing a series of pictographs, undoubtedly gave the "joint" the proper atmosphere.

The artifacts indicate that the cave was used for a long period of time, one kind of game succeeding another in popularity.

The cave is situated in territory occupied in historic times by Indians of a Northern Paiute band, the Wadadokado.

Science News Letter, July 23, 1949

AERONAUTICS

Jet Fighter Has Radar Nose Replacing Air-Intake Prow

➤ A RADAR nose replaces the air-intake front of the fast jet-propelled F-84 Thunderjet in a modified airplane now making flight tests, it was revealed by Republic Aviation Corporation, Farmingdale, N. Y. The radar nose is capable of housing equipment for seeking out and intercepting enemy bombers, company officials state.

Side inlet ducts for air-intake replace the former opening which was directly centered on the plane's nose. In the position adopted, they are found to give the desired flow characteristics and pressure recovery, at the same time providing ample room for equipment installations with a minimum change in both structure and aerodynamics characteristics.

This is one in a series of company developments carried out in conjunction with its own experimental and research program, and it should not be construed that the Air Force intends to install this new type nose on present or future F-84s under contract, the company asserts. However, the Air Force has just revealed a new version of the Thunderjet, which will be known as the F-84E, already in production by Republic.

The new version has a 25% increase in pounds thrust, over 50% increase in range, and a service ceiling of over 45,000 feet, or 5,000 feet more than the present model. The nose section of the fighter has been lengthened 15 inches to provide more room for the pilot, and a new cabin pressurization and air-conditioning system will provide pilot comfort.

Science News Letter, July 23, 1949

VETERINARY MEDICINE

Somersaulting Chicks May Lack Vitamin E

➤ BABY chicks that turn somersaults and walk backward instead of in the normal forward direction are not necessarily training for careers in Hollywood or on the television stage. There's a fair chance that what ails them is a lack of vitamin E in their diet, Dr. Erwin L. Jungherr of the University of Connecticut told the meeting of the American Veterinary Medical Association in Detroit.

Poultrymen call the condition "crazy chick disease". Less spectacular symptoms are a tendency to fall over on one side, and a general incoordination of movement. It can happen even to chicks getting enough vitamin E, if their rations also contain food elements that destroy the vitamin in the body. Moreover, certain toxic chemicals, notably coal tar derivatives, can produce symptoms that may be confused with vitamin E deficiency.

Science News Letter, July 23, 1949

ASTRONOMY

Jupiter Now Prominent

But planet, Venus, which is brighter, is seen early on August evenings. Vega, in Lyra, the lyre, is the most brilliant of the stars.

By JAMES STOKLEY

➤ THOUGH Venus, seen early on August evenings, is brighter, it is the planet Jupiter that is most prominent now during the night. Venus, of magnitude minus 3.4 on the astronomical scale, is some 12 degrees above the western horizon at sunset, so it can be seen in the gathering dusk, but by the time the sky is fully dark it has dropped from sight. Not until October will it remain in the sky much after the end of twilight.

Jupiter is now only about a third of Venus' brightness, of magnitude minus 2.2. However, it is seen against a dark sky background, and that makes it more conspicuous. Its position is shown on the accompanying maps. These give the appearance of the skies at about 10:00 p. m., your standard time, at the first of August, an hour earlier at the middle of the month, and two hours earlier at the end. (Add an hour if you are on daylight time).

Teapot Shape

The planet is in the constellation of Sagittarius, the archer, in which the stars can be seen to outline the shape of a teapot. Towards Jupiter (just above the U in the word Sagittarius) are four stars which mark the handle. The spout is to the right, just above the curved row of stars which form the tail of Scorpius, the scorpion. Also, in Sagittarius, is a dipper, the so-called "milk dipper." The four stars that make up the handle of the teapot are the bowl of the dipper, and the handle extends up toward the M in the name of the constellation of Scutum, the shield.

In Scorpius is the bright star, characteristically red in color, Antares. The name means "rival of Mars," because that planet, which is not now visible, is also famous for its redness.

Most brilliant of the stars, rather than planets, which can now be seen, is Vega, in Lyra, the lyre, practically overhead for the times of the maps. Just east of this group we see Cygnus, the swan, part of which forms a cross-shaped figure often called the northern cross. The star Deneb is at the northern end of the cross. Lower than Cygnus, in the south, we can find Aquila, the eagle, with first-magnitude Altair.

Looking toward the northwest, we can see the big dipper, part of Ursa Major, the great bear. As is well known, the two lowest stars in the dipper, as it now stands, are the pointers. They indicate the direction of the north star, Polaris, which is at the end of the handle of the little dipper, and this, in turn, is part of Ursa Minor, the lesser bear. Following the curved handle of the large dipper around toward the west, we come to the bright star Arcturus, which is in the figure of Bootes the bear driver.

Many features lend interest to Jupiter. For one thing, it is the biggest of the nine major planets that revolve around the sun. Its mean diameter is 86,850 miles, as compared to 7,927 miles for the earth. Thus its volume is more than 1,300 times that of the earth, yet its density is much less, and its mass is only 318 times that of our home planet.

Through a telescope, Jupiter has a noticeably oblate, or "door-knob," shape. Its diameter from pole to pole is 5,760 miles less than at the equator, and the reason for this is found in its rapid speed of rotation. Even though it is so big, it makes one turn on its axis in 9 hours 55 minutes and the centrifugal force throws the material at the equator relatively far from the center. There is a similar effect with the earth, but because of our smaller size and slower rotation the bulge is much less. Our equatorial diameter is only about 27 miles greater than that measured between the two poles.

Knowing the mass of Jupiter, and its rotation, astronomers have been able to calculate how much the bulge should be, if the mass were uniformly distributed, and they find that it should have a much larger bulge than it does. This indicates, therefore, that the planet is not uniform in density, but that there is a considerable concentration toward the center, surrounded by outer layers so low in density that they must be gaseous.

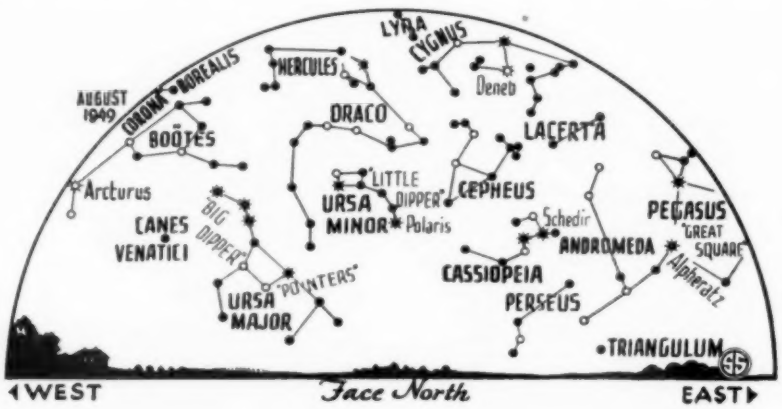
This is confirmed by the changes that are observed on the surface of Jupiter, and which could not occur in a solid planet. There are red and brown belts, which cross its face parallel to the equator but which vary from time to time both in width and number. Other marks have come and gone, particularly the "Great Red Spot," an elliptical region some 30,000 miles from east to west and 7,000 miles from north to south. This first appeared in 1878, and was brick red in color. Later it faded, although the outlines can still be detected. It did not remain fixed but drifted around, and also shifted in latitude. No one knows its cause, but it was certainly part of a gaseous surface.

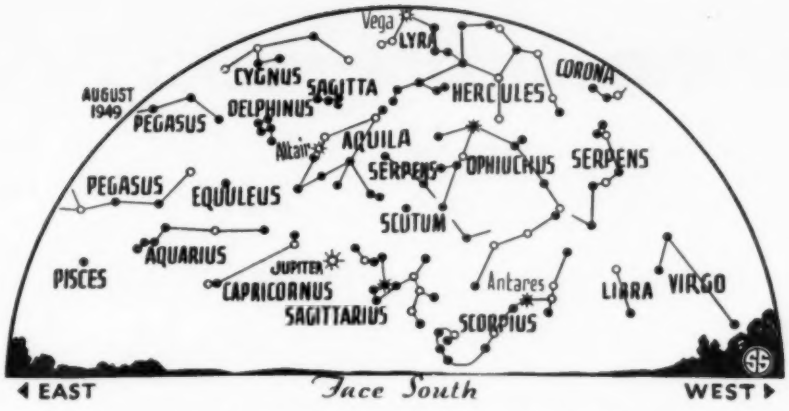
Jupiter Is Cool

Until a few years ago astronomers thought Jupiter was quite hot, and that heated currents of gases caused turbulence which accounted for the changes. Measurements, however, have shown it to be quite cool, about 184 degrees below zero, Fahrenheit. If it received heat only from the sun, it should be still colder, about 220 degrees below zero, so possibly there is some internal source of heat, such as volcanic activity, which may account for the change.

Analysis of the light of Jupiter through the prisms of the spectroscope, showed it to be mainly reflected sunlight, though dark bands were observed in the orange and red parts of the spectrum. The explanation of these came in 1932 from a young German astronomer, Rupert Wildt, who is now at Princeton.. He showed that these absorptions would be caused by methane, or marsh gas, and ammonia. This was confirmed shortly afterwards by Dr. Theodore Dunham, at Mt. Wilson Observatory, who produced similar bands in the laboratory when he passed light through these gases in a pipe 60 feet long.

In addition to methane and ammonia, the atmosphere of Jupiter is also believed to contain hydrogen, though the bands that gas would produce cannot be observed. If there were ever any nitrogen, which constitutes the bulk of the earth's atmosphere,





✡ ✱ ○ • SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS

it has probably all been combined with hydrogen to form the ammonia. Any oxygen would have probably combined with the hydrogen to form water, which in turn has probably frozen and fallen far out of sight.

Thus, according to Wildt's hypothesis, the structure of Jupiter is as follows: At the center is a rocky-metallic core, with a radius of about 37,000 miles. Then comes a layer of ice, a frozen ocean 34,000 miles deep and then the outer layer of gases, some 16,000 miles deep, of frozen ammonia in an atmosphere of hydrogen and methane. Dr. F. L. Whipple, of Harvard, has suggested that there may be no sharp transition between these layers, but that the clouds gradually become thicker with depth, finally turning into a layer of ammonia slush which still farther down becomes solid. Surely not a very attractive home for any imaginary inhabitants!

Time Table for August

Aug.	EST	
1	7:57 a. m.	Moon in first quarter
6	9:48 p. m.	Moon passes Jupiter
8	2:33 p. m.	Full moon
12	early a. m.	Meteors of Perseid shower visible
13	3:00 p. m.	Moon farthest, distance 251,600 miles
16	5:59 p. m.	Moon in last quarter
23	10:59 p. m.	New moon
26	9:58 a. m.	Moon passes Venus
30	2:16 p. m.	Moon in first quarter

Subtract one hour for CST, two hours for MST, and three for PST.

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ASTRONOMY

Survey Milky Way Stars

➤ BRIGHTEST stars of the Milky Way are being surveyed by wide-eyed Schmidt telescopes in the United States and Mexico, the American Astronomical Society was told in Ottawa, Canada.

A 48-inch Schmidt telescope on Palomar Mountain in California is to be used in photographing the sky for a new astronomical atlas (*See SNL,* June 25, p. 406), but the survey of the Milky Way's bright lights is already well along elsewhere, American and Mexican scientists reported.

Schmidt cameras at the Warner and Swasey Observatory of the Case Institute of Technology, East Cleveland, Ohio, and at the Tonanzintla Observatory in Mexico are being used to search for high luminosity stars of the Milky Way galaxy. Collaborating with Dr. J. J. Nassau, director of the Warner and Swasey Observatory, are Dr. W. W. Morgan, Yerkes Observatory of the University of Chicago, and Dr. Paul Annear of Baldwin-Wallace College. The Mexican research is directed by Dr. L. E. Erro.

Because the Mexican observatory is farther south, it can search areas of the sky invisible or too low for satisfactory observation from Cleveland. Photos made by both the observatories are expected to cover most of the Milky Way.

Results of the survey will give a fairly good picture of the intrinsically brightest stars up to distances of 32,000 light years from the earth. (A light year is the distance light, with a speed of 186,000 miles per second, travels in a year.)

The Schmidt telescopes in this survey photograph a field of stars through what is called an objective prism, a huge piece of optical glass whose two sides are inclined to each other a few degrees. The telescope photographs short rainbow-colored bands of starlight, known as star spectra. From these spectra, the brightest stars can be easily picked out from those of less luminosity.

The program at Case is carried out jointly with the Yerkes Observatory and is financially supported by the Office of Naval Research.

Science News Letter, July 23, 1949

BLACK LIGHT

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ENGINEERING

River Basin Planning

➤ A NEW river-basin-planning technique is now being applied in the American development of hydroelectric power. It takes into consideration all the possible uses of the water in the basin, for domestic purposes, irrigation, navigation and recreation, as well as the need for flood-control.

This technique may be described as a new branch of engineering, combining hydraulic, civil and electrical engineering into "river-basin engineering," the UNSCCUR will be told at Lake Success this summer by Leland Olds of the American Federal Power Commission. UNSCCUR is short for the international group the full name of which is the United Nations Scientific Conference on the Conservation and Utilization of Resources.

The essential elements in the new program, he will explain, include viewing the entire river as a physical unit to be developed rather than limiting the planning to individual projects. The needs within the entire river basin for the various water uses are appraised in terms of their relation to and effect upon the development of power.

Various alternative plans for dams, reservoirs, waterways, and power plants are laid out upon a multiple-purpose water use basis, and analyzed physically and economically to determine the best plan for power consistent with the other water uses. The various plans are weighed in terms of the construction and operation of the river system upon existing improvements, and particularly upon the flooding of agricultural lands.

Cardinal to all plans studied is the adequate control of the stream through storage reservoirs. Because of the impact of inundations due to storage in the more highly developed areas, he will say, large reservoirs are generally found more practicable in the headwater and tributary streams, with developments only for pondage and power head on the main stem of the stream.

Analysis of the economic feasibility of hydroelectric developments is based on the most economic alternative source of power, which is generally steam-electric. These two sources of power, however, are not looked upon as competitive, but as having their own peculiar characteristics and values achieved through their complementary use.

Science News Letter, July 23, 1949

ENGINEERING

Ocean-Spanning Rockets

➤ OCEAN-SPANNING rockets, and even rockets that may circle around the earth and remain aloft for weeks, may be looked upon as probabilities, Dr. H. L. Johnston of the Ohio State University declared. He spoke as a guest of Watson Davis, director of Science Service, on Adventures in Science, heard over the Columbia network.

In order to cross the ocean a rocket would have to gain a speed of about 9,000 miles an hour shortly after takeoff, he said. To circle the earth like a miniature planet at, say, 1,000 miles altitude, a rocket speed of 22,000 miles an hour is necessary. With a little more speed, 25,000 miles per hour, the rocket could be sent to the moon or into outer space like a Buck Rogers space ship. The great essential in acquiring these speeds is proper fuel.

Only a fuel like hydrogen has the potentiality of giving a rocket the necessary acceleration to allow it to escape from the earth although some other fuels might be used, he asserted. Hydrogen itself would accomplish the job more easily if one or more "booster" rockets are employed to accelerate the main rocket before its own engine starts firing.

Dr. Johnston described experimental work of the past two years at Ohio State with rocket motors that use liquid hydrogen as a fuel and liquid oxygen to enable the hydrogen to burn. The rocket motor carries its own supply of oxygen. All other engines, including those not widely used in jet-propelled airplanes, depend upon surrounding air for oxygen. The rocket motor is the only type that can be employed in high altitude flight where the air is thin or non-existent.

Liquid hydrogen is ordinary hydrogen gas converted to a liquid by cooling it below its boiling point, which is a minus 423 degrees Fahrenheit, he explained. It looks like water but is only one-twelfth as heavy. It is completely non-combustible and non-explosive by itself but burns with intense heat in contact with liquid oxygen. The temperature in the combustion chamber of the motor may reach 6,000 degrees Fahrenheit, many hundreds of degrees above the melting point of the nozzle and of the chamber walls.

The exhaust from a liquid hydrogen-liquid oxygen rocket can obtain a speed in excess of 8,000 miles an hour, which is 50% greater than that obtainable by the use of alcohol as a fuel, as in the German V2 used to bomb London during the latter part of the war.

However, he added, it is possible to impart even greater speed to the rocket since it can be shown that the rocket obtains a speed higher than its exhaust when the weight of the propellant used for the rocket exceeds about 65% of the gross weight before takeoff. With a 90% propellant load the rocket can be accelerated to double the speed of the exhaust and with a 96% propellant load it can move at three times the exhaust speed.

In discussing the best fuels, he stated, "The maximum exhaust velocities will be provided by those propellant combinations that produce the most heat in burning and, at the same time, form the lightest gases in the combustion products. On both these counts the combination of liquid hydrogen and liquid oxygen ranks near the top."

Science News Letter, July 23, 1949

AERONAUTICS

Two Types of Jet Engines Power Flying Wing Bombers

See Front Cover

➤ BOTH turbojet and turbo-prop engines will be used for power in a new version of the Air Force's giant Flying Wing bomber, a product of Northrop Aircraft, Inc., Hawthorne, Calif., at whose plant the 100-ton piston-engined B-35 bombers are being converted to more modern propulsion.

Turbojets are the type of engines used in the ordinary jet-propulsion. The turbo-prop utilizes a somewhat similar gas turbine but the high-pressure gases formed are directed against vanes or buckets on a shaft, causing rapid revolution of the shaft which in turn operates conventional propellers.

The turbo-prop to be used is a product of Turbodyne Corporation, also located there, and it is said to be the world's most powerful aircraft engine. This new engine, until now unrevealed, has undergone an ardous testing program at the corporation's test cell and has now advanced to the flight test stage.

Three new versions of the Flying Wing will result from this modification program. Most unusual of the new versions will be a six-jet Flying Wing which will serve as a flying test bed for the new powerful Turbodyne engine. This airplane, designated the EB-35-B, in its first phase tests will be powered by six turbojet engines with the test Turbodyne mounted slightly to the left of the center of the plane, delivering its power through a large dual-rotation propeller.

All of the converted planes will be powered by new, improved Allison J-35 turbojet engines. The basic powerplant arrangement provides for four engines to be submerged in the wing in dual bays, and for two to be suspended in individual streamlined pods, as shown in the artist's conception on this week's cover of the SCIENCE NEWS LETTER.

Science News Letter, July 23, 1949

RESOURCES

Water Use Increasing

➤ MUCH talk on water resources of the world is scheduled for the UNSCCUR meeting to be held at Lake Success, N. Y., in August, it was revealed. Theatened shortages due to increasing uses are beginning to create widespread interest in the best procedures for conservation and use. At least a score of papers on various phases of the subject will be presented by outstanding authorities.

The phenomenal increase in the use of water in the city, on the farm, and by industry has been an impelling force in accelerating the inventory and appraisal of water resources in the United States, C. G. Paulsen of the U. S. Geological Survey will tell this international group whose full name is the United Nations Scientific Conference on the Conservation and Utilization of Resources.

Fortunately, in large parts of the earth the supplies of fresh water are comparatively plentiful. However, in many places the development of our industrial and social economy has created water demands of a magnitude and variety that have exceeded all previous ideas or expectations, he will state. Consequently, supplies which have until recently been considered as essentially inexhaustible are now recognized to have limits which, either immediately or prospectively, fix the extent of development.

In developing a program for a region, such as a river basin, adequate knowledge of the occurrence and characteristics of the available water resources is a prerequisite to wise planning and successful operations. It is pertinent to the development of the resources of the region no less than is the adequate coverage of the area by suitable maps and by knowledge of the geologic formations and conditions which affect both surface water runoff and ground water movement and storage.

Increased activities in fundamental water investigations will be urged by Mr. Paulsen. They would be concerned not only with water supplies but with the fluctuations in the supplies. In water investigations there is a need to recognize the importance of every phase of the hydrologic cycle, he will state. This cycle is the system of never-ending circulation of water by movement through streams and underground formations, by evaporation and transpiration from the earth to the atmosphere, and its return as rain or snow.

Science News Letter, July 23, 1949

AERONAUTICS-METEOROLOGY

Plane Time-Saving Routes

➤ THE fastest airplane time between two points is not always by way of the shortest route, Kenneth J. Arrow, of the Air Weather Service in Washington, points out in the JOURNAL OF METEOROLOGY (April). Faster time is made by taking advantage of strong tail winds and the weaker head winds.

Between air terminals the short route follows a great circle, an imaginary line between the points which if continued around the globe would cut its surface in two halves. In short flights, the deviation from the great-circle route can not be very large, so that no great advantage can be obtained, except in unusual conditions. In longer flight, some 1,000 miles or more, deviation from the great-circle route may save considerable flight time.

With the steady increase in the effective range of modern planes, the possibilities and importance of saving time by suitable choice of the route grow, he states. While the principles involved are universally accepted, little attention has been paid to the determination of the exact route which can be flown in the minimum length of time. In the past few years, the development of the radio altimeter has stimulated discussion of determining the geostrophic wind from an airplane flight. Geostrophic winds are those whose directions are determined by deflective forces which are caused by the rotation of the earth.

The solution of this problem, he continues, has led to a method of determining a single heading such that an airplane starting from a given origin with that heading will, without change of heading, reach a desired destination. A single-heading flight has obvious advantages from the standpoint of the pilot.

The particular problem, which Mr. Arrow discusses, is that of determining which, among the various steerable routes available, will require the least amount of time. Much mathematics are involved. Earlier work is quoted by the writer. The solution takes the form of a differential equation, understandable to the modern navigator, which the plane's heading is to satisfy.

Science News Letter, July 23, 1949

GENERAL SCIENCE

Language, Poisonous Fish Included in SIM Program

➤ STUDIES ranging from language to poison fish will be made in the Trust Territory of the Pacific by a team of six American scientists.

Dr. I. Dyen of Yale University will do research on the language spoken on the island of Yap as a part of a new program called SIM, scientific investigations in Micronesia.

Poisonous fish in the Palaus will be the subject of studies by Miss Eugenie Clark of the American Museum of Natural History.

Other SIM scientists are: Dr. Robert K. Enders of Swarthmore College, who will seek scientific data on rat control on the islands; Dr. M. W. de Laubenfels, University of Hawaii, who will conduct a sponge survey of several islands; Sidney Glassman of the University of Oklahoma who will make a botanical survey of Ponape island; and Irwin Lane of the University of Hawaii, who will make a botanical survey in the Palaus; Mrs. Ann Meredith of Radcliffe College, who will carry out research in social anthropology in the Truk area.

Ecological research for the Army Quartermaster Corps will be carried out by Dr. R. R. Frosberg of Catholic University, assisted by Donald Anderson, botanist of Honolulu. They will leave for the Trust Territory in September.

Science News Letter, July 23, 1949

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BOTANY

NATURE RAMBLINGS
by Frank Thone

National Flowers

➤ GOLDENROD is coming into bloom over many miles of prairie and in millions of fencerow thickets; its bright sprays will return greetings to the sky until first frosts signal the sun's retreat for another season. Sturdy, tough-stemmed, able to take care of itself in any kind of situation, it is a typically American plant.

So American is the goldenrod that many people advance its claim to honors as the American national flower—a spot in the world's official flora that has not yet been filled. There is some reason in this claim. It belongs to a highly developed, widely adapted genus; its four-score or so species are found practically altogether on the North American continent, with only a couple of outliers in the Old World. Symbolically it would be a good choice: as a member of the composite family, in which many small flowers combine to form one federated bloom, it typifies very neatly the American national motto, "E Pluribus Unum."

Principal contender against the goldenrod, and as stoutly supported by its advocates, is the columbine. This lovely flower also has its unique symbolism, for its common name is an appeal to the dove of peace, whereas its botanical title, Aquilegia, is supposed to be an eagle-reference, inspired, perhaps, by the resemblance of its flower spurs to the talon of our national emblem.

Goldenrod and columbine suffer from opposite but equal handicaps in their flowering time. The best-known of our several native columbine species, found in practically all Eastern and Midwestern woodlands, is out of bloom by July 4, except in the extreme northern part of this country. On the other hand, no goldenrod is showing its gold until several weeks after Independence Day. So neither of the two contenders is able to be present at the celebration of the nation's birthday.

Goldenrod is further handicapped by the widespread though erroneous belief that it is a prime cause of hay fever. Actually, almost no hay-fever cases can be traced to its pollen. However, its conspicuous blossoms reach their fullest development just when the ragweeds, the real hay-fever villians, are shedding their pollen. So the innocent goldenrod gets the blame.

Science News Letter, July 23, 1949

Quick-Reading Temperature-Conversion Tables

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July 23, 1949

ENTOMOLOGY

Insects Destroy Wood

➤ THE modern army sometimes has to fight a human foe but it has to carry on a continuous fight against the insects that destroy wood in structures and in all sorts of military equipment. This was indicated by W. D. Reed of the Army Corps of Engineers and T. E. Snyder of the U. S. Department of Agriculture at a national symposium on wood held in Washington.

The symposium was sponsored by the National Research Council and the Office of Naval Research, and was attended by national experts on wood and its uses from the leading research laboratories of the country. At the same meeting, wood-rotting fungi were discussed by Marshall W. Jennison and Richard Henderson of Syracuse University.

The lowering of the quality and grade of wood due to holes and staining, together with the actual loss of material eaten by borers, is caused primarily by two types of insects, one requiring wet and the other dry wood, Messrs. Reed and Snyder stated. In some cases the injury is caused by adult beetles which fly to the log or lumber and bore directly into the wood. In other cases, damage is caused by young larvae hatching from eggs laid under the bark or in the wood.

Particular attention was devoted to ambrosia beetles, or pinhole borers, that attack green wood, and to termites that attack both green and dry wood. Controls against both were discussed. Marine borers also came in for consideration.

The wood rots, of which some 2,000 species are known, are fungi of the class Basidiomycetes, the meeting was told by the Syracuse University bacteriologists. These rots typically grow on woody materials, living or dead trees, structural timbers, or woody decomposing deposits in nature. These organisms are the chief fungi that can attack the cellulose-lignin complex which is characteristic of wood.

The undesirable activities of these fungi are their destructive effects on structural timber. However, the very fact that in the degradation of cellulosic materials they form new chemical compounds suggests the possibility that their activities can be turned into economically-useful channels.

Science News Letter, July 23, 1949

Words in Science—
WEIGHT-MASS

➤ MASS is not the same thing as weight.

Weight can, however, be used as a measure of mass, because weight is proportional to mass. The weight of an object is a force. It depends on the attraction with which the earth pulls on it. This attraction (gravity), and hence the weight of the object, changes with distance from the center of the earth and also as the object is moved about on the surface of the earth. You would weigh more at the North Pole than at the Equator.

Mass is a quantity, not a force. The unit of mass is not a pound, but a geepound or slug, which corresponds approximately to the mass of matter which weighs 32.2 pounds at sea level.

Weight is measured by a spring balance which measures the force required to stretch the spring. Such a scale would show less weight for the same objects at sea level and at the top of a high mountain. A balance scale, on the other hand, measures mass. No matter where it is located, the reading is the same for the same object.

Science News Letter, July 23, 1949

Books of the Week

TO SERVE YOU: To get books, send us a check or money order to cover retail price. Address Book Dept., SCIENCE NEWS LETTER, 1719 N St., N. W. Washington 6, D. C. Ask for free publications direct from issuing organizations.

ADAPTING WAR SURPLUS TO EDUCATIONAL USE—Robert E. Iffert—35 p., illus., paper, limited number of copies free upon request to Veterans Educational Facilities Program, *Office of Education*, Washington 25, D. C. Helpful hints on how to convert items of war surplus for use in the laboratory or on the campus. Food mixing machines, for example, can be used in cement work.

AMERICAN EDUCATION AND INTERNATIONAL TENSIONS—Educational Policies Commission—*National Education Association of the United States* and *American Association of School Administrators*, 54 p., paper, 25 cents. Recommending among other things that members of the Communist Party should not be employed as teachers.

THE BEE HUNTER—George Harold Edgell—*Harvard University Press*, 49 p., illus., $2.50. A book for nature lovers giving clear and practical instructions for finding a bee tree and the delicious reward of wild honey. Written by an enthusiast who has pursued this hobby for 50 years.

BUTADIENE FROM ETHYL ALCOHOL: Study of the Variables of Operation—B. B. Corson, E. E. Stahly, H. E. Jones and H. D. Bishop—*Mellon Institute*, 6 p., illus., paper, free upon request to publisher, University of Pittsburgh, Pittsburgh 13, Pa. In 1944 more than 700,000,000 pounds of butadiene was produced from ethyl alcohol.

DESCRIPTION OF A RELAY CALCULATOR—Staff, Computation Laboratory—*Harvard University Press*, 366 p., illus., $8.00. Detailed, technical description of the "automatic brain" fomerly known as Mark II now in operation at the Naval Proving Ground, Dahlgren, Va.

EXPERIMENTAL PHYSICS FOR COLLEGES—Walter A. Schneider and Lloyd B. Ham—*Macmillan*, rev., ed., 442 p., illus., $3.80. The majority of the experiments are designed to be worked by the whole class, working in pairs.

EXPLORER OF THE HUMAN BRAIN: The Life of Santiago Ramon y Cajal (1852-1934)—Dorothy F. Cannon—*Schuman*, 303 p., illus., $4.00. This interesting biography of a great histologist is prefaced by a memoir of Dr. Cajal by Sir Charles Sherrington.

FISHERY STATISTICS OF THE UNITED STATES 1945—A. W. Anderson and E. A. Power—*Govt. Printing Office*, 372 p., illus., paper, $1.50. Data on the catch by place and kind of fish. The pictorial section would be useful in identifying the catch of an amateur.

INTERNAL-COMBUSTION ENGINES: Power Test Codes 1949—*American Society of Mechanical Engineers*, 50 p., paper, $1.50. The code as now issued is entirely new.

THE NEW YORK ACADEMY OF MEDICINE: Its First Hundred Years—Philip Van Ingen—*Columbia University Press*, 573 p., illus., $10.00. A Fellow of the Academy and member of the library committee writes a learned history of the organization.

THE STORY OF MAPS—Lloyd A. Brown—*Little, Brown*, 397 p., illus., $7.50. The history of maps, the men who made them, and the methods they employed.

THE SUPERSENSITIVITY OF DENERVATED STRUCTURES: A Law of Denervation—Walter B. Cannon and Arturo Rosenblueth—*Macmillan*, 245 p., illus., $5.50. Report of researches planned and begun by the late Dr. Cannon, continued by him in collaboration with Dr. Rosenblueth and finished by Dr. Rosenblueth who also completed the monograph.

THE TASK OF NATIONS—Herbert V. Evatt—*Duell*, 279 p., $3.00. The Australian statesman, president of the General Assembly of the United Nations writes about some of the vital problems faced by that organization. An appendix includes the charter of UN.

THE TERPENES, VOLUME I, The Simpler Acyclic and Monocyclic Terpenes and Their Derivatives—J. L. Simonsen—*Cambridge University Press*, 2d ed., 479 p., $8.50. A book for chemists on those terpenes which occur in nature.

Science News Letter, July 23, 1949

MEDICINE

Check Stomach Bleeding

➤ NEW WAYS to stop bleeding from the stomach and upper digestive tract were announced to the American Medical Association in Atlantic City. In one, a double balloon arrangement is put down the patient's esophagus, or gullet, till the lower balloon reaches the upper part of the stomach.

This balloon treatment was devised by four Detroit doctors to stop bleeding from ruptured veins in the esophagus, a condition called esophageal varices, which may end fatally.

Inflating the balloons just the right amount stops the bleeding by pressure. The method succeeded in 18 of 20 patients. Of the failures, one turned out to have had an ulcer lower in the digestive tract and the other was in the last stages of cirrhosis of the liver. In the last case, the balloons had not been checked and became deflated.

The second method for stopping bleeding in cases of stomach ulcer and cancers consists in using the blood chemical, thrombin, to make the blood clot at the bleeding point and thus stop the hemorrhage. The trick in this method is to protect the thrombin from the stomach acid which makes it ineffective. This is done by washing out the patient's stomach first with a phosphate solution and dissolving the thrombin in a solution containing phosphate.

The doctors reporting these methods are Drs. Byrne M. Daly, Elwood A. Sharp, Walter H. Seegers and Thomas B. Patton of Wayne University College of Medicine.

The thrombin method controlled bleeding in 114 of 140 patients. In 14 cases, the bleeding stopped but then started up again. These had to have another thrombin treatment. Some had to have operations as well.

Science News Letter, July 23, 1949

VETERINARY MEDICINE

Veterinary Case Histories Of Diseases Indexed

➤ "CASE histories" of diseases in animals, similar to those long familiar in human medical practice, are now being assembled and indexed, Dr. William H. Feldman of the Army Institute of Pathology reported to the American Veterinary Medical Association meeting in Detroit. Among the 5,964 cases already indexed, there are 2,046 on dogs, 190 on cats, 991 on horses and 567 on cattle. There are even classes for birds, reptiles and fish. Veterinarians all over the country contribute information to the register, and in turn draw upon it for aid in study of difficult cases coming under their own observation.

Science News Letter, July 23, 1949

The Biography of a Disease **POLIO**

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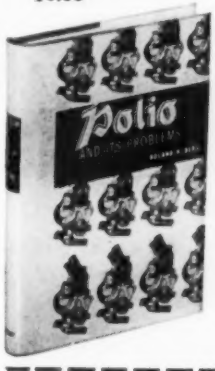

and its Problems

by Roland H. Berg

The dramatic cavalcade of tireless research, perilous experiment and stern persistence as science answers the challenge of infantile paralysis. Here is a tribute to those who fight against the disease—a record of the steps taken—a report of progress in treatment.

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⚙ *ROLLING PIN, a non-traditional type, actually is a combination of eight small parallel rollers in a circular frame with a grasping handle above. The multi-roller, made entirely of a non-porous plastic, flattens dough to a uniform thickness and without the wavy conformation produced by the single roller.*

Science News Letter, July 23, 1949

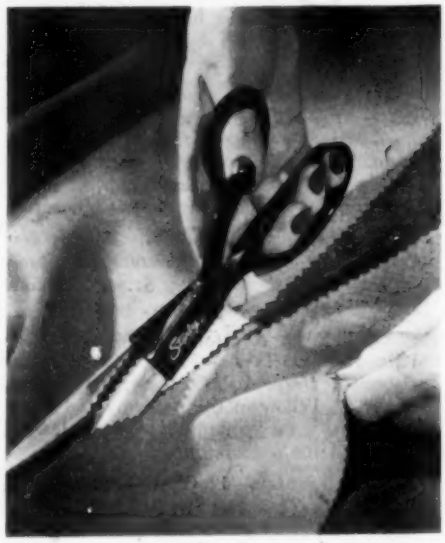
⚙ *SPARK PLUG for motor boats, designed to eliminate engine-induced interference with radio-telephone sets, has a built-in 10,000-ohm carbon resistor which, in effect, cancels out the lingering spark impulses that make miniature radio transmitters of the ordinary plug. Their cost is low.*

Science News Letter, July 23, 1949

⚙ *FLOOR LAMP, with an adjustable standard, can be raised or lowered to any height desired. This recently patented device is a telescoping type, with the upright in three or more sections made to slide one within another and held in place by means of a special clamping mechanism.*

Science News Letter, July 23, 1949

⚙ *PINKING SHEARS, shown in the picture, have plastic handles that make the tool light and easy to manipulate. The handles are molded to fit the curvature of the hand, and have enough flexibility to adjust to individual hand and arm pressure. Blades are hardened steel with a durable chrome-satin finish.*



Science News Letter, July 23, 1949

⚙ *SAFETY HANDLE for automobile doors, to prevent children from accidentally opening a door while the car is in motion is a replacement handle, easily installed, which is disengaged from the door lock by the turn of a key. The door can be opened from the outside at all times as originally made to operate.*

Science News Letter, July 23, 1949

⚙ *REVERSIBLE WRIST watch, which can be turned dial face inward to protect it from injury at a workbench, for instance, is slid along a metal frame and flipped over, leaving its steel back facing upward. This Swiss product is a rectangular watch with a strong leather or metal wrist band.*

Science News Letter, July 23, 1949

⚙ *COLOR FILM for the professional motion picture industry is an entirely new, synthetic polymer which is also a color former. It is a product which takes the place of both the gelatin binder and the color former heretofore used, providing results in excellent color reproduction and improved image.*

Science News Letter, July 23, 1949

• Do You Know? •

Palladium, sister of platinum, is increasingly used in jewelry.

A *crane* equipped with a modern 29-inch round electromagnet can lift five tons.

Some half a million *fish-hooks* are made a day in the United States; amateur fishermen buy 50% of them.

Even the *birds* that feed extensively on seeds most of the year feed largely on insects during the spring.

Platinum has been known to the scientific world only about 200 years, while gold has been in use some 6,000 years.

The 1948 world production of *non-ferrous metals* was 268% greater than in prewar days.

Standard weights most generally used are made of brass; platinum and aluminum are often used for weights of one gram or less.

The present year marks the 400th anniversary of *Bahia, Brazil*, a Portuguese settlement 16 years older than the St. Augustine settlement in Florida.

The *population* of the world has doubled in the past century, according to the best estimates available; in 1850 it was some 1,091,000,000, it is thought.

The North Atlantic 1949 *iceberg* season, which ended June 15, was the mildest and shortest in recent years; in other years it has continued as late as August.

One of the world's best *cows* is a 16-year old Holstein at the Pennsylvania State College which has produced 236,325 pounds of milk containing 7,466 pounds of butterfat up to about April 1, 1949.

Some of the so-called *carnivorous plants* that trap and digest insects are so independent of the normal sources of nitrates that they are able to live in extremely poor soil.

Non-broadcast *television* service will probably do many jobs in the near future including the guarding of asylum and prison corridors and making it possible to watch chemical or radioactivity action from a protected position.

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